Effect of Hi Y Power Tests on AOA Receivers

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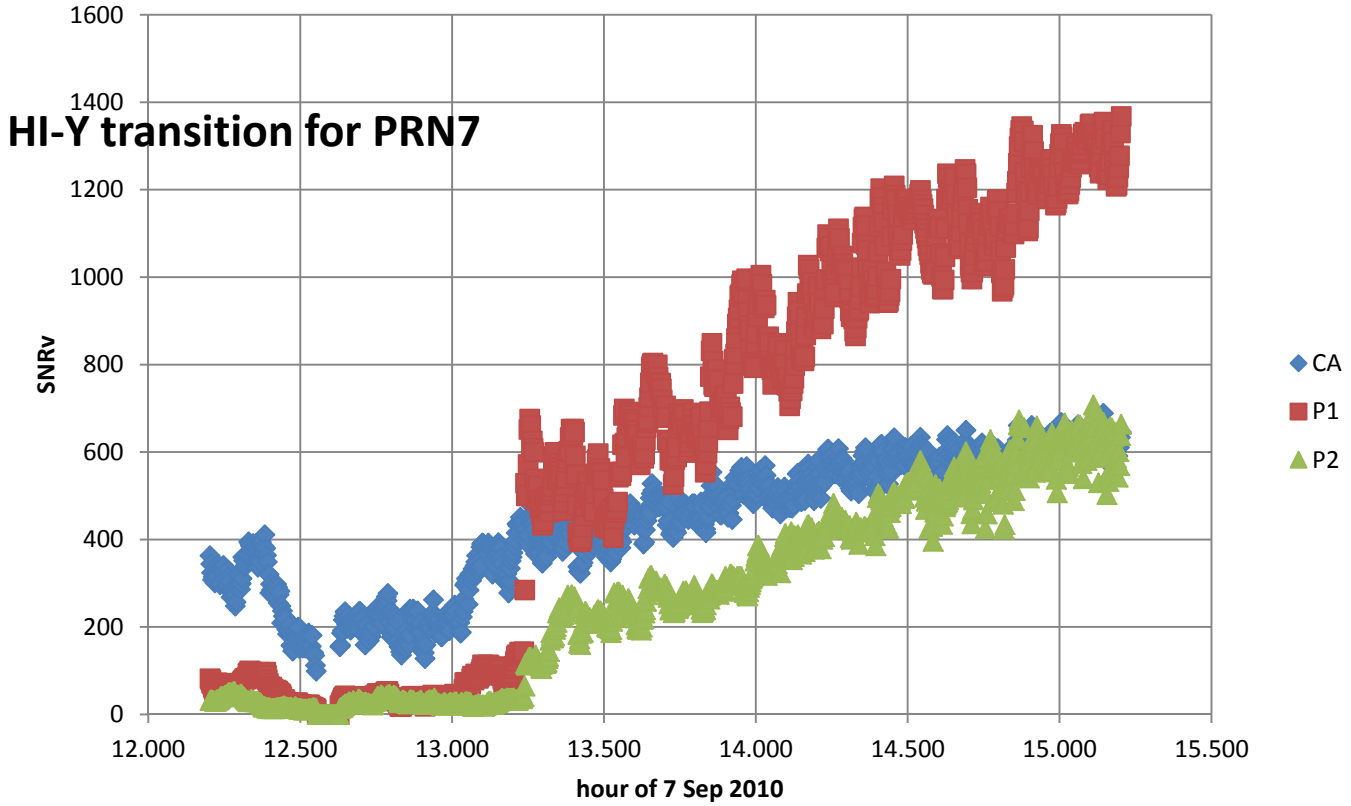
Outline

- Test description
- Data from JPL monitoring
- Data acquired from Canadian ground network
- My guess as to what happened
- Should we discourage Hi-Y power implementation?

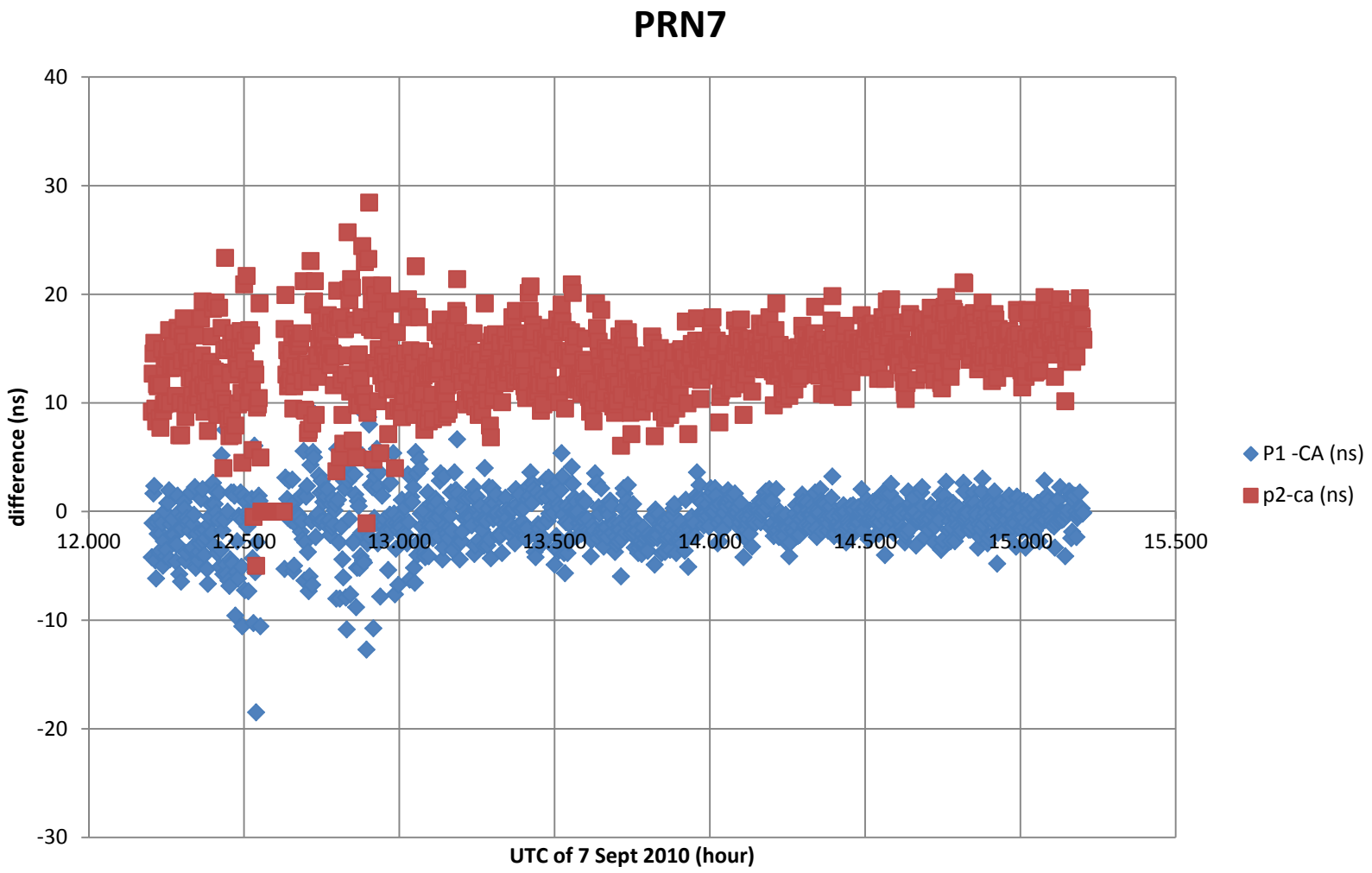
Test Description

- From 7 to 11 Sept 2010
- IIR-M satellites broadcast over parts of this time with higher Y-code power on P1 and P2. Power increase observed to be on the order of 6 dB

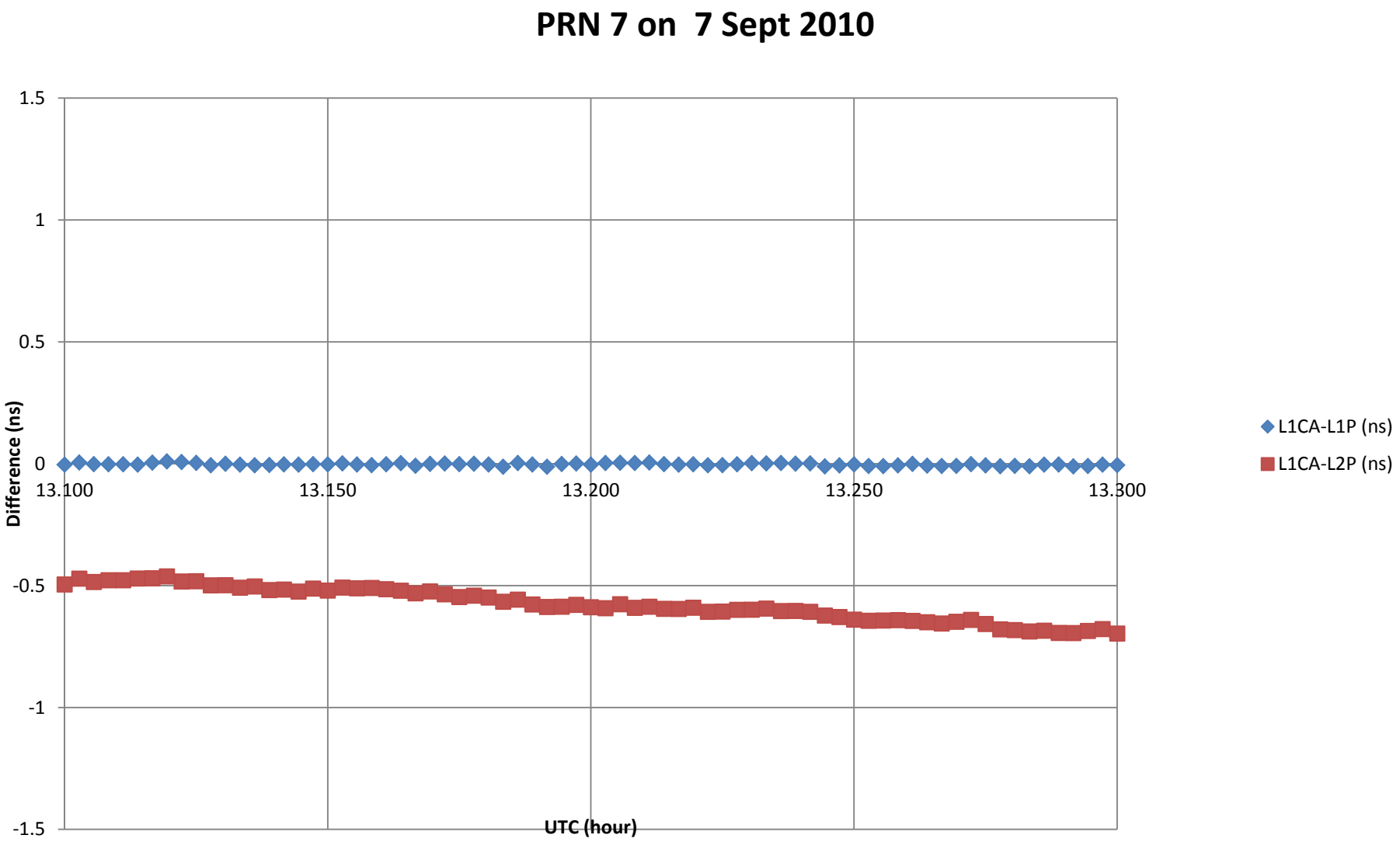
Observed from JPL



Observed from JPL Pseudorange Stability



Observed from JPL
Carrier Phase Stability

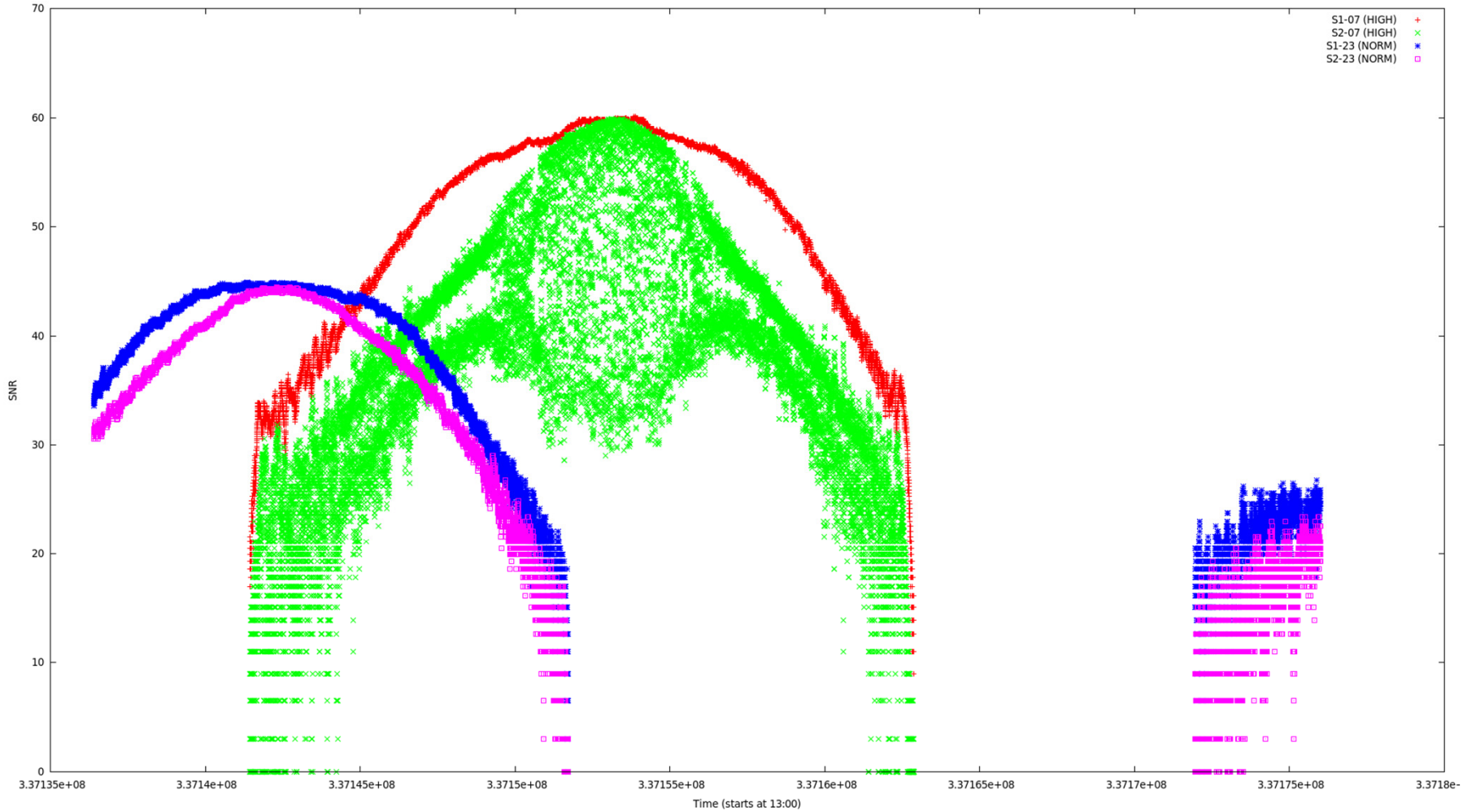


JPL Results

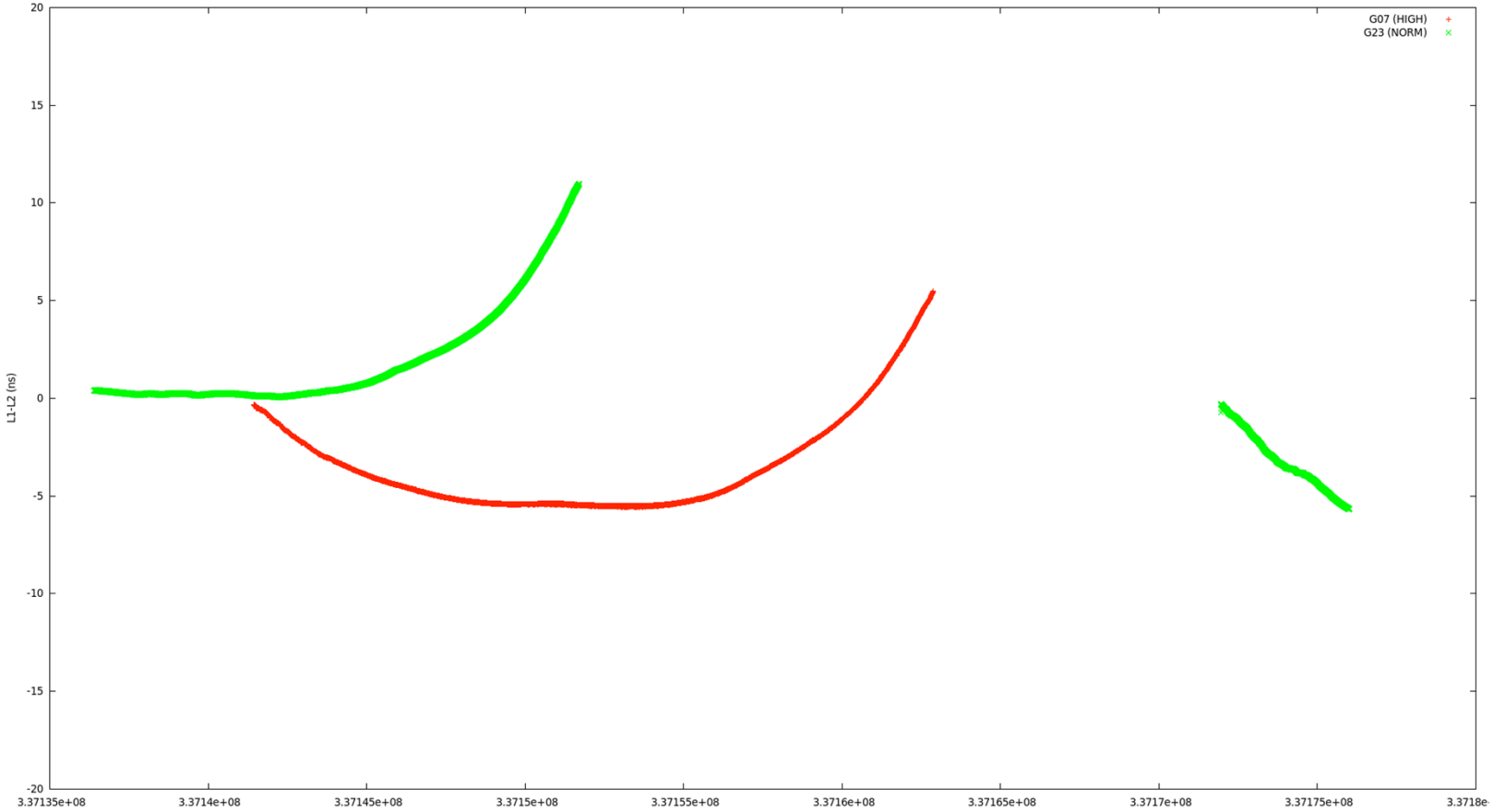
- We saw SNR transition with no noticeable effect on carrier nor pseudorange

- Received reports from Canadian Network, other users of AOA receivers, also some of the JPL flight receivers using a particular software “feature”

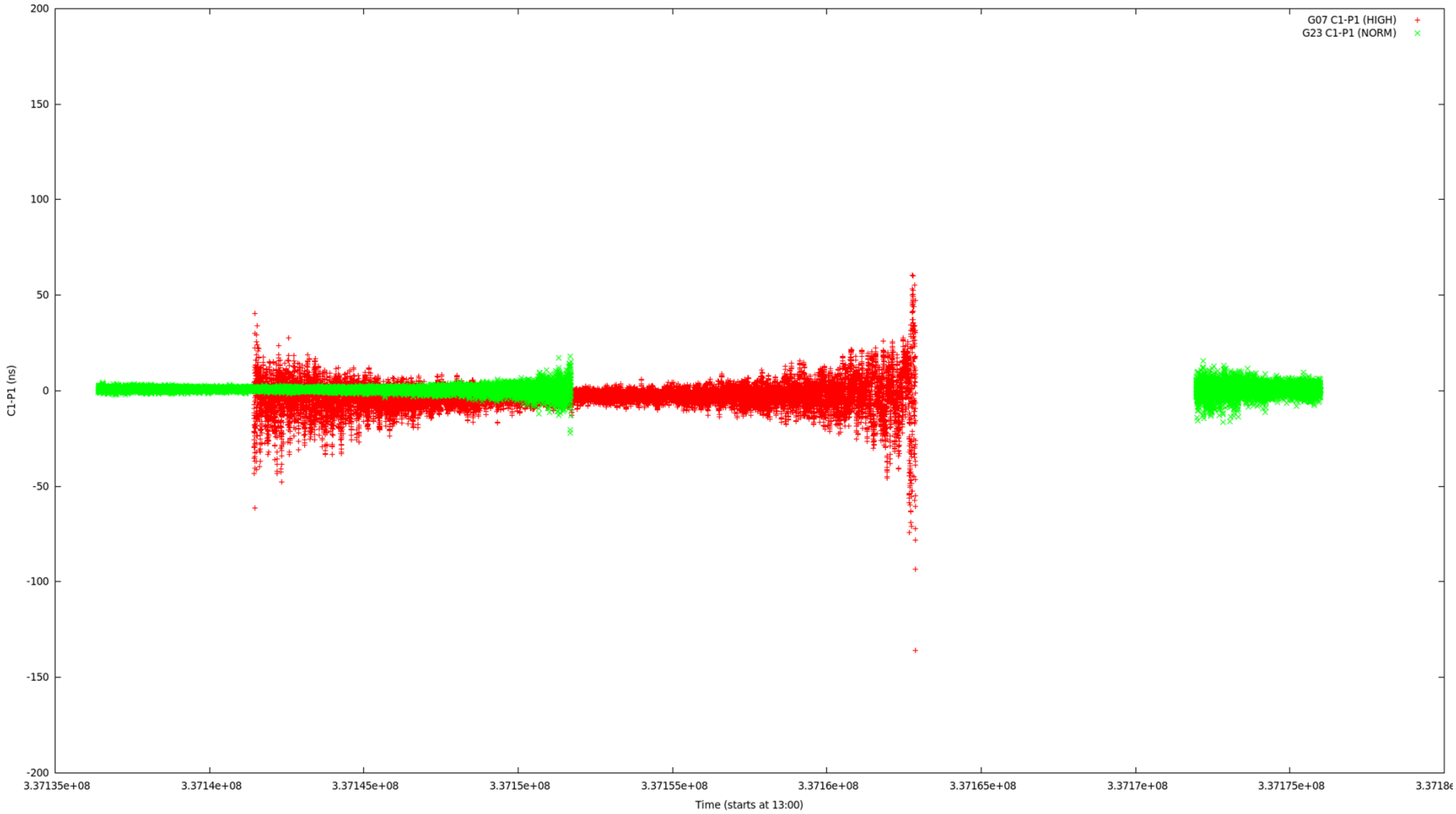
AOA Benchmark SNR @ ALGO



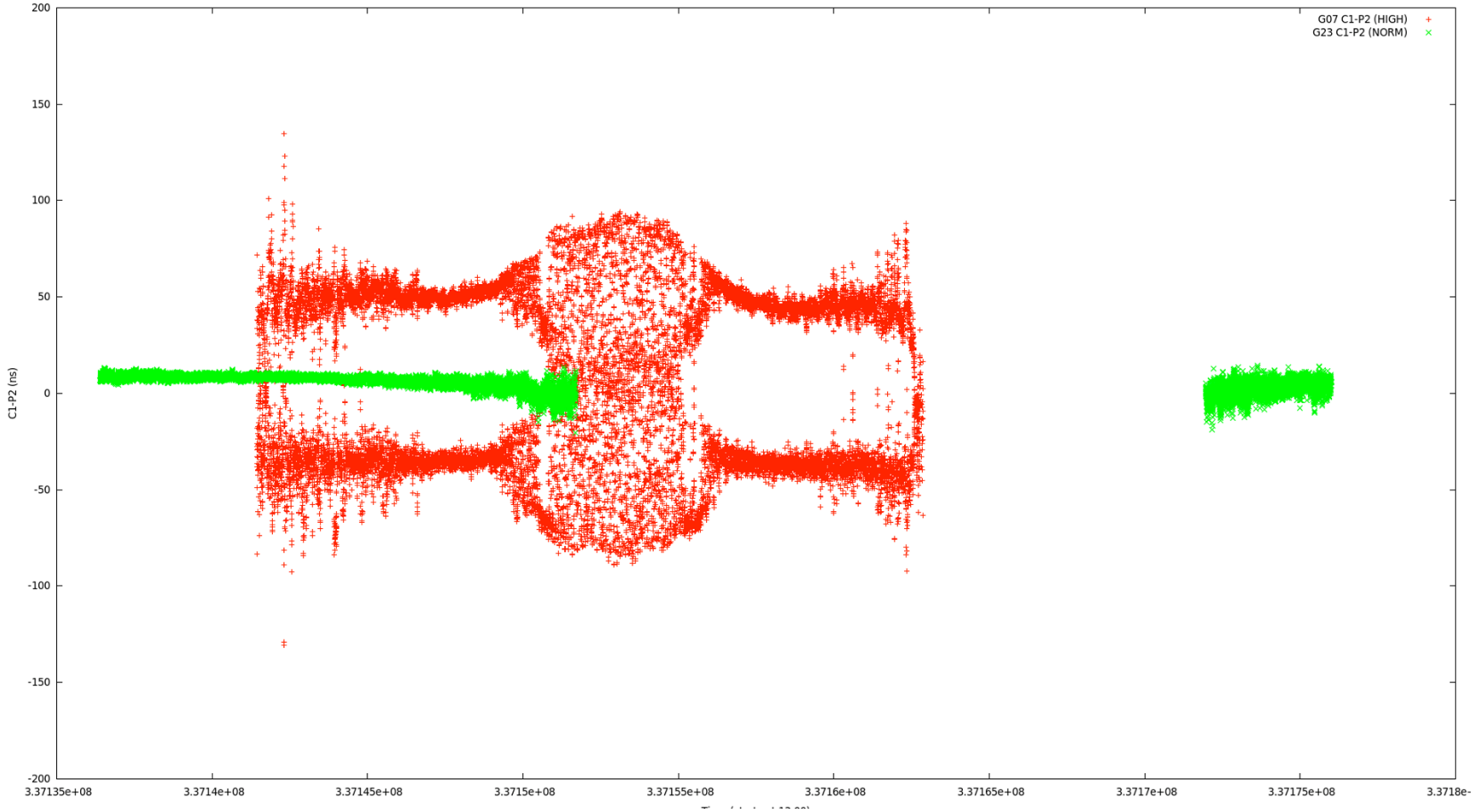
AOA Benchmark Phase @ ALGO



AOA Benchmark P1 @ ALGO



AOA Benchmark P2 @ ALGO



My Guess

- Believe source of problem to be a version of “Chili-con –Carne” semi-codeless algorithm which was enhanced for low-SNR operation. It apparently fails with high SNR conditions such as seen during recent tests.
- JPL has not had resources to confirm this behavior using simulators under laboratory conditions

My Recommendation

- I do NOT believe we should discourage testing or implementation of Hi-Y power based on this effect.
- Informal discussions with others affected by this show they agree.